



Australia's dengue risk driven by human adaptation to climate change

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Year: 2009
Journal: PLoS Neglected Tropical Diseases. 3 (5): e429

Abstract:

BACKGROUND: The reduced rainfall in southeast Australia has placed this region's urban and rural communities on escalating water restrictions, with anthropogenic climate change forecasts suggesting that this drying trend will continue. To mitigate the stress this may place on domestic water supply, governments have encouraged the installation of large domestic water tanks in towns and cities throughout this region. These prospective stable mosquito larval sites create the possibility of the reintroduction of *Ae. aegypti* from Queensland, where it remains endemic, back into New South Wales and other populated centres in Australia, along with the associated emerging and re-emerging dengue risk if the virus was to be introduced. **METHODOLOGY/PRINCIPAL FINDINGS:** Having collated the known distribution of *Ae. aegypti* in Australia, we built distributional models using a genetic algorithm to project *Ae. aegypti*'s distribution under today's climate and under climate change scenarios for 2030 and 2050 and compared the outputs to published theoretical temperature limits. Incongruence identified between the models and theoretical temperature limits highlighted the difficulty of using point occurrence data to study a species whose distribution is mediated more by human activity than by climate. Synthesis of this data with dengue transmission climate limits in Australia derived from historical dengue epidemics suggested that a proliferation of domestic water storage tanks in Australia could result in another range expansion of *Ae. aegypti* which would present a risk of dengue transmission in most major cities during their warm summer months. **CONCLUSIONS/SIGNIFICANCE:** In the debate of the role climate change will play in the future range of dengue in Australia, we conclude that the increased risk of an *Ae. aegypti* range expansion in Australia would be due not directly to climate change but rather to human adaptation to the current and forecasted regional drying through the installation of large domestic water storing containers. The expansion of this efficient dengue vector presents both an emerging and re-emerging disease risk to Australia. Therefore, if the installation and maintenance of domestic water storage tanks is not tightly controlled, *Ae. aegypti* could expand its range again and cohabit with the majority of Australia's population, presenting a high potential dengue transmission risk during our warm summers.

Source: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2671609>

Resource Description

Climate Scenario : ☒

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES), Other Climate Scenario

Special Report on Emissions Scenarios (SRES) Scenario: SRES A1

Climate Change and Human Health Literature Portal

Other Climate Scenario: CSIRO: Mk2 Climate Change Pattern

Exposure : 

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Precipitation, Temperature

Extreme Weather Event: Drought

Temperature: Fluctuations

Geographic Feature: 

resource focuses on specific type of geography

Urban

Geographic Location: 

resource focuses on specific location

Non-United States

Non-United States: Australasia

Health Impact: 

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Dengue

Mitigation/Adaptation: 

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: 

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: 

format or standard characteristic of resource

Research Article

Timescale: 

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content